The specification has been amended to correct minor typographical, grammatical and syntax errors. The Applicants aver that no new matter has been added to the instant application.

Additionally, the Applicants have provided an Abstract section to the instant application. A separate sheet containing the Abstract is submitted herewith. The Applicants aver that no new matter has been added to the instant application.

The Applicants respectfully request entry of the above amendments. The Applicants submit that no new matter has been added. The Applicants respectfully submit that the application is in condition for substantive examination, and such examination is respectfully requested.

Respectfully submitted,

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PRW/PHS/phs

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

On pages 2-3, the Brief Description of the Invention section has been rewritten as follows:

In a broad aspect of the invention, a motor control circuit for a direct current electric motor having a pair of direct current inputs supplied respectively from negative and positive current sources wherein [said] the motor is actuated to turn a shaft in one of two directions dependant on which polarity of current is being provided to [said] the motor, [said] the motor control circuit comprising, a pair of unipolar control circuits wherein [a respective one] at least one of [each] the unipolar control circuits is connected between a respective current source and a current input to [said] the motor wherein [a respective] at least one of the unipolar control [circuit which] circuits is adapted to operate [said] the motor in one of [said] the two directions,

a motor control circuit [according to claim 1] wherein each of [said] the unipolar control circuits are substantially identical[.],

a motor control circuit [according to claim 1] wherein [each of said] at least one of the unipolar control circuits further comprises,

a solid state switch located between [a said] the motor current input and [said] the source of direct current wherein the degree to which [said] the solid state switch allows current to flow to [said] the motor is controlled by an input bias signal to [said] the switch,

a current limiting [means] member for adjusting said input bias signal according to the current flowing through [said] the motor, such that [said] the solid state switch [switching means] adjusts [said] the input bias to [said] the solid state switch such that less current flows through [said] the motor when a predetermined period of current limiting has occurred, and

a motor control circuit [according to claim 3] wherein [said] the current limiting [means] member further comprises a temperature compensation circuit.

On Page 4, the last full paragraph has been rewritten as follows:

In the example of an outside rear view mirror housing which is foldable relative to the vehicle body between a folded position and a lateral position, a single electric motor can be connected to a mechanical [means] member for translating the rotational motion of the motor's shaft into a movement of the mirror housing between the described positions.

On Page 5, the fifth full paragraph has been rewritten as follows:

However, this is but one preferred [characteristics] characteristic of the motor control arrangement for determining when to switch off or substantially reduce power to the motor.

On Page 7, the fourth full paragraph has been rewritten as follows:

Current flows through the diode of Q4 (a parasitic diode which is available in transistors of this general type), through the motor RM, through Q1 and through current sense resistors R8 and R9. This diode provides reverse current blocking and over voltage protection but in other circuit configurations, a Zener diode of suitable characteristics could be across the output devices. In the preferred embodiment solid [states] state switches Q1 and Q4 are each a Metal Oxide Silicon Field Effect Transistor (MOSFET) semi-conductor transistor device.

On Pages 8-9, the paragraph spanning the bottom of page 8 to the top of page 9 has been rewritten as follows:

The increase in current through the thermistor R2 with increasing temperature will cause an increased voltage across R7. This voltage reduces the voltage appearing across the base emitter junction of Q3. The effect is to off-set the reduction in base emitter voltage required by Q3 with increased temperature. R7, R2 and R1 are chosen to give a best fit current versus temperature curve. R1 limits the maximum current that can flow when very high temperatures are experienced by the system. It is worth noting that temperature compensation can be used to produce other than flat responses to accommodate for material softening [etc] in the mechanics.

On Page 11, the first line has been rewritten as follows:

[THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS] What is claimed is:

IN THE CLAIMS

The claims have been rewritten as follows:

1. (Amended) A motor control circuit for a direct current electric motor having a pair of direct current inputs supplied respectively from negative and positive current sources wherein said motor is actuated to turn a shaft in one of two directions dependant on which polarity of current is being provided to said motor, said motor control circuit comprising[,]:

a pair of unipolar control circuits wherein [a respective] at least one of [each] said unipolar control circuits is connected between a respective current source and a current input to said motor, wherein [a respective] at least one of said unipolar control [circuit which] circuits is adapted to operate said motor in one of said two directions.

2. (Amended) A motor control circuit according to claim 1 wherein each of said unipolar control circuits [are] is substantially identical.

3. (Amended) A motor control circuit according to claim 1 wherein each of said unipolar control circuits further comprises:

a solid state switch located between [a] said motor current input and said source of direct current wherein the degree to which said solid state switch allows current to flow to said motor is controlled by an input bias signal to said switch,

a current limiting [means] member for adjusting said input bias signal according

to the current flowing through said motor, such that said [switching means] solid state switch adjusts said input bias to said solid state switch such that less current flows through said motor when a predetermined period of current limiting has occurred.

4. A motor control circuit according to claim 3 wherein said current limiting [means] member further comprises a temperature compensation circuit.

6. (Amended) A motor control circuit according to claim 3 wherein said solid state switch [means] member is arranged to not operate said motor when said current limiting is occurring for a further predetermined period of time.

7. (Amended) A motor control circuit according to claim 3 wherein said solid state switch [means] member is arranged to not operate said motor when current drawn by said motor exceeds a predetermined threshold current for a predetermined period of time.

8. (Amended) A motor control circuit according to claim 3 wherein said current limiting [means] member comprises:

a motor current sensing circuit comprising a shunt resistor arranged to carry a proportion of the current flowing through said motor and provide a respective voltage to the base of a bipolar transistor which is arranged to turn on at a predetermined voltage level representative of the current flowing through said motor at which it should be switched off, such that said bipolar transistor turns on when said predetermined voltage level is reached and which decreases the input bias to said solid state switch to lessen the current through said motor.

9. (Amended) A motor control circuit according to claim 1 wherein [each of the other] at least one of said pair of unipolar control circuits conducts current to complete the circuit to allow said motor to operate.

10. (Amended) A motor control circuit according to claim 1 wherein [each] at least one of said unipolar control circuits further comprises:

a solid state switch located between [a] said motor current input and said source of direct current wherein the degree to which said solid state switch allows current to flow to said motor is controlled by an input bias signal to said solid state switch,

a current detection [means] member to detect the magnitude of current being drawn through said motor and if said magnitude exceeds a predetermined level for a predetermined time reduce said input bias signal to said switch.

Abstract

A motor control circuit for a direct current electric motor has a pair of direct current inputs supplied respectively from negative and positive current sources. The direction of travel of the rotor of the motor is determined by the polarity of the current supplied to it. A new motor control circuit includes a pair of substantially identical unipolar control circuits. Each of the unipolar control circuits being connected between a respective current source and a current input to the motor wherein a respective unipolar control circuit is adapted to operate the motor in one of the two directions. Each of the unipolar control circuits includes a solid state switch located between a motor current input and the source of direct current. The degree to which the solid state switch allows current to flow to the motor is controlled by an input bias signal to the switch. Current limiting for adjusting the input bias signal according to the current flowing through the motor is provided in one way of controlling the motor movement. The switch adjusts the input bias to the solid state switch such that less current flows through the motor when a predetermined period of current limiting has occurred. Also a current detection can be used to detect the magnitude of current being drawn through the motor and if the magnitude exceeds a predetermined level for a predetermined time, the input bias signal to the switch can be reduced.